

III. "*On Dischidia Rafflesiana*." By PERCY GROOM, M.A. Communicated by S. H. VINES, F.R.S. Received February 1, 1893.

*The Function of the Pitchers.*—The pitchers contain living ants and acari, small quantities of insect remains, considerable amounts of earth, humus, and water; but all these bodies and substances are not found in each pitcher. The earth and humus, though partially brought to the pitchers by the agency of rain-water, are mainly conveyed thither by ants, which nest within the pitchers. That the roots within the pitchers utilise these solid matters is suggested by the following facts, observed on living plants in the Botanic Garden, Singapore:—1. The roots are well developed in pitchers containing a rich store of earth and humus. 2. Sometimes these solid substances are arranged up the whole of one side of the cavity of the pitcher, in which case the roots are more strongly developed on the same side; these phenomena, in some cases at any rate, could not have been occasioned by water having previously been distributed in the pitcher in the same manner. 3. Particles of earth are found clinging closely to the root-hairs, which are always well developed in the presence of solid substances. Actual experiments on living plants prove that the pitcher-roots can absorb liquids. The pitchers are not mere water-reservoirs; they are depositories for solids from which, by means of the roots within the pitchers, the plant derives part of its nutriment. Probably the evolution of the pitchers has been, to a great extent, determined by the myrmecophilous habits of the plant.

*Structure of the Roots.*—In the young state there is an epidermis, many of the cells of which grow out to form root-hairs. The hairs of the climbing roots are more numerous on the side towards the supporting stem or branch of the host-plant ("ventral side"), where they form a mycelium-like web. The hairs of the roots within the pitchers are more uniformly distributed, but are numerous and short at regions where the root is in contact with the pitcher-wall or with another root. The hairs of the pitcher-roots, and those on the ventral side of the climbing roots, persist for a long time, and are cuticularised: elsewhere the epidermis disintegrates. The epidermoidal layer or exodermis is made up of cells, the walls of which are cuticularised and lignified. The outer walls of the passage-cells of this layer are thick, often possess pits, and are traversed by what may be either radial canaliculi or radial rods of a substance differing from the rest of the wall. Close beneath the exodermis of the pitcher-root, usually separated from it by one layer of cells, are about six bands of sclerenchyma; these bands are absent from the climbing

roots, or only feebly developed on the dorsal side. The cortical layer next to the exodermis constitutes itself into a cork-cambium; and in the pitcher-roots a secondary cork-cambium arises within the bands of sclerenchyma. Cork is not formed on the distal parts of the pitcher-roots, nor within the most ventral portion of the climbing roots. Sometimes there is a group of large wood-vessels in the ventral portion of the vascular cylinder.

The points especially worthy of note in the roots of *Dischidia Rafflesiana* are—

1. The early cuticularisation of the root-hairs, and the long persistence of these structures, which, in climbing roots, remain to function as anchoring threads.
2. The curious passage-cells of the exodermis, which do not possess thin cellulose-walls.
3. The precocious development of cork to prevent excessive loss of water.
4. The radial structure and large sclerenchyma-bands of the pitcher-roots.
5. The dorsi-ventral structure of the climbing roots, as revealed in the formation of root-hairs and cork; also as seen in the structure of the cortex and even of the vascular cylinder.

IV. "The Har Dalam Cavern, Malta, and its Fossiliferous Contents." By JOHN H. COOKE, F.G.S. With a Report on the Organic Remains, by ARTHUR SMITH WOODWARD, F.L.S., F.G.S., F.Z.S. Communicated by HENRY WOODWARD, LL.D., F.R.S., V.P.G.S. Received February 2, 1893.

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